

Document made available under the Patent Cooperation Treaty (PCT)

International application number: PCT/CA2006/000320

International filing date: 07 March 2006 (07.03.2006)

Document type: Certified copy of priority document

Document details: Country/Office: US
Number: 60/658,580
Filing date: 07 March 2005 (07.03.2005)

Date of receipt at the International Bureau: 10 April 2006 (10.04.2006)

Remark: Priority document submitted or transmitted to the International Bureau in compliance with Rule 17.1(a) or (b)



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APPLICATION NUMBER: 60/658,580

FILING DATE: March 07, 2005

THE COUNTRY CODE AND NUMBER OF YOUR PRIORITY APPLICATION, TO BE USED FOR FILING ABROAD UNDER THE PARIS CONVENTION, IS US60/658,580

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Under Secretary of Commerce for Intellectual Property
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Certifying Officer

13281
U.S. PTO

PROVISIONAL APPLICATION COVER SHEET

To the Commissioner of Patents and Trademarks
Alexandria, VA 22313

This is a request for filing a PROVISIONAL APPLICATION under 37 CFR 1.53(b)(2).

Docket No.	14997PRO	Type a plus sign (+) inside this box -	+
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TITLE OF THE INVENTION (280 characters max)

HIGH ALCOHOL CONTENT FOAMING COMPOSITIONS WITH SILICON-BASED SURFACTANTS

**PLEASE ASSOCIATE THIS APPLICATION WITH
CUSTOMER NO. 000293**

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ENCLOSED APPLICATION PARTS (check all that apply)

☒ Specification 44 Number of Pages

METHOD OF PAYMENT (check one)

<input checked="" type="checkbox"/> A check or money order is enclosed to cover the Provisional filing fees	Provisional filing fee amount(s)	\$ 200.00
<input checked="" type="checkbox"/> The Commissioner is hereby authorized to charge any additional fees and credit any overages to Deposit Account Number: <u>04-1577</u>		

Respectfully submitted

Signature: [Signature] Date: March 7, 2005Typed or Printed Name: Ralph A. Dowell Registration No.: 26,868112935 U.S. PTO
60/658580

030705

UNITED STATES PROVISIONAL PATENT APPLICATION

**Title: HIGH ALCOHOL CONTENT FOAMING COMPOSITIONS
WITH SILICONE-BASED SURFACTANTS**

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HIGH ALCOHOL CONTENT FOAMING COMPOSITIONS WITH SILICONE-BASED SURFACTANTS

FIELD OF THE INVENTION

5 The present invention relates to compositions with high contents of lower alcohol (C_{1-4}) that could be dispensed as a foam. The compositions to be dispensed as foams contain a silicone-based surfactant and when mixed with air provide a stable alcohol foam which can be used for personal cleaning or for disinfecting purposes.

BACKGROUND ART

10 Ethanol and/or Isopropyl alcohol compositions with at least 60% percent v/v (approximately 52% by weight) are well known to be antibacterial, therefore widely accepted for disinfecting purposes. Nonetheless due to the inherent characteristics of alcohol, it is perceived that the higher the content the better the product and a solution with higher than 60% by volume alcohol content is more desirable.

15 Alcohol disinfectant solutions are generally thickened in order to eliminate the waste and facilitate spreading the composition throughout the desired area. It is also known that other than gelling agents one can use paraffin or waxes to achieve thickening of a solution with high alcohol concentration. Such a composition with lanolin added to reduce the melting point closer to body temperature is described in United States Patent No. 2,054,989. One of the disadvantages of gels and the above-mentioned type of thick alcohol-containing compositions is that if they do not leave a tacky feeling on the hands after one use (although some do), the effect

20

builds up after repetitive use during the day, making it necessary to eventually wash off the thickeners before continuing the usage of an alcohol antiseptic solution. The present invention if formulated for the above-mentioned type of product does not leave such a feel, and does not need to be washed off after repeated use.

5 Another way of thickening high alcohol content solutions has also been taught in United States Patent Nos. 6,090,395 and 6,623,744 where emulsifiers and surfactants are used as the thickening system to produce a hydroalcoholic lotion with a viscosity of at least 4,000cps. Also, United States Patent No. 4,956,170 discloses polyethoxylated non-ionic surfactants/emulsifiers to stabilize the added
10 emollient oils in addition to a fatty alcohol although with the addition of a polymeric thickening agent to prepare a hydroalcoholic skin moisturizing/conditioning antimicrobial gel. The disinfecting compositions of the present invention that are gel-like have a viscosity lower than 4,000 cps and no polymeric thickening agent is added.

15 Generally speaking a high alcohol content disinfectant solution disinfects but does not clean. In order to make them disinfect and clean, so much soap would need to be added to the solution that the skin would feel soapy and disagreeable resulting in a formulation that would have little commercial appeal. Nonetheless, a non-irritant skin disinfecting formulation with a high content of a lower alcohol for use
20 as a skin-washing agent has been successfully achieved by combining emulsifiers, surfactants and skin emollients as described in United States Patent No. 5,629,006.

 Surfactants other than for cleaning purposes are also used for spreading an aqueous composition containing one or more active substances rapidly and evenly

over a surface due to their wetting properties. The use of good wetting agents definitely improves the efficient use of active substances in different compositions as described in United States Patent No. 5,928,993. Hence, the composition described in the present invention includes the addition of surfactants, specifically silicone-based surfactants which are well known for their excellent wetting power and which are also surface-active in the lower alcohols used as disinfectants and solvent systems in levels which make them acceptable even for rubbing alcohol purposes, providing cleaning, wetting and foaming properties to the composition.

Although a high alcohol content disinfectant solution has good disinfectant characteristics, it has a sharp smell and is generally perceived to cause drying of the skin, characteristics which can also be diminished to a desirable level in the present invention.

A foam product with greater than 40% v/v alcohol, which is easy and safe to use, is desirable over conventional gel or ointment type composition products. The concentration of alcohol already poses a hazard in itself, and there are many applications in which the perceived risk may be diminished if it could be dispensed as a foam without the use of pressurized aerosol containers. A foam intended to be useful as a skin disinfecting agent must have a uniform consistency, spreadability, cleansing ability, and have a pleasant feel, i.e. have rapid breaking power when pressure is applied; all of which present a challenge for a high lower alcohol content composition.

The description of an aqueous foaming skin disinfecting composition using 15% w/w alcohol as a co-solvent, which requires no pressurized container or added propellant to produce the foam, is described in United States Patent No. 3,962,150.

The foam-forming agents utilized heretofore, have been incapable of forming stable foams when the liquid phase has high alcohol content without using other ingredients. Furthermore, lower alcohols have been considered to be defoamers rather than foam-promoting chemicals. According to Klausner, in United States Patent No. 3,131,153, if more than 64% alcohol is used non-homogeneous compositions are obtained. The compositions in the patent required propellant to foam and the foams produced were of limited stability.

Prior to this invention, when a greater than 40% v/v alcohol concentration is required in a product, it is generally accepted that the product will be either liquid or gel, and that if a foam is desired then the concentration of alcohol would need to be reduced or the use of a propellant and a pressurized system would be required.

Surprisingly, in the few "foamable" high alcohol content products disclosed, the types of foam obtained were not similar to those expected from aqueous solutions. The foams obtained are described as fast or aerated foam, quick breaking, with low or limited stability, which would not last for more than one minute, being generally gone within seconds.

It has been disclosed that fluorosurfactants and alcohol can be combined to produce a "stable" foam by a process using high-pressurized means to generate the foam. Highly stable pressurized foams containing high contents of lower alcohol and methods of forming and using such pressurized foams in the oil industry using a

non-ionic surfactant or mixture of non-ionic surfactants of a specific group of fluorosurfactants are provided in United States Patent No. 4,440,653. The compositions in this patent require the use of a pressurized gas system to generate the foam.

5 Various examples of compositions with a high content of a lower alcohol that are dispensed as a foam have been described, although for the purpose of the present invention the concentrations of alcohol and the levels of other ingredients are not suitable. More importantly, the use of propellants and aerosol containers to generate the foam is not desirable. For example, the compositions described in
10 United States Patent No. 5,906,808\ disclose a product that uses an emulsifying wax NF, and a combination of stearyl and cetyl alcohol, or other wax combinations, which improve the foaming performance of the composition, in combination with cetyl lactate, to produce a 0.8% chlorhexidine gluconate alcohol product.

15 United States Patent No. 5,167,950 issued to Lins discloses a foam product which requires a propellant and where no surfactant is added as a cleaning agent. The composition disclosed in this patent is based upon using an emulsifier system (fatty alcohol ROH 16-22 carbons) in combination with the use of a thickening agent (carbomer, klucel, etc.) to produce an antimicrobial aerosol mousse having a high alcohol content. The mousse includes alcohol, water, a polymeric gelling agent and
20 a surfactant system comprising a C16-C22 alcohol, aerosol propellant and a non-ionic polyethoxylated surfactant.

Despite the work done to date it has been shown that there is little specific knowledge on how foams react and are formed, and surprisingly formulations that

might seem not foamable result in the best foam producing ones while other formulations which seemed to have been producing foam even while being prepared did not perform well at all in some non-aerosol foam dispensers. The behaviour of aqueous foams is not the same as that of an alcohol foam.

5 Silicone-based surfactants have been used in applications requiring lowering of the surface tension and increased wetting properties, especially in applications that require materials to be compatible with solvent systems other than water and non-reactive to other components in the compositions. Silicone surfactants are desirable since they can achieve surface tension levels with relatively low
10 percentages. Examples of this are crop protection products, printing inks, paints, floor coatings, etc.. The characteristics mentioned above make silicone surfactants a candidate for the intention of this patent.

 The traditional ways of forming a gel using polymeric thickeners presents undesirable characteristics and similarly little has been done in forming emulsion-like
15 thickened gels.

 It would be very advantageous to have alcohol based disinfecting formulations which may be dispensed as a foam. Further, it would be very advantageous and desirable to find a foaming agent that could be used in concentrations that would allow it to be used in products that can remain in the area
20 on which they have been applied and do not need to be rinsed or wiped off due to small amounts of residue remaining after evaporation. Thus it would also be very advantageous to provide foams that do not leave an unpleasant sticky after-feel as

most commercial alcohol gel products are known to, or which clog up the dispensing equipment used to dispense the foams.

SUMMARY OF THE INVENTION

5 It is an object of this invention to provide high alcohol content compositions, which contain a surfactant/cleaning agent as well as a disinfectant/cleaning/solvent/carrier and that causes very little drying to the skin or the hands of the user and is able to be dispensed as a foam from both pressurized and non-pressurized systems.

10 The present invention provides high alcohol content compositions that are able to be dispensed as a foam, which are readily spread over the desired surface. Amongst the different applications where such compositions might be of use, it is another object to also provide an antimicrobial alcohol foam. The foamable compositions when dispensed from a suitable dispenser are stable and do not
15 require the use of propellants and pressurized containers.

These and other objects and advantages will be apparent from the following description of the invention. All percentages provided herein are based on the total weight unless otherwise indicated.

Accordingly, the present invention provides compositions for personal
20 hygiene, as follows.

The present invention provides a foamable composition, comprising:

a) a C₁₋₄ alcohol, or mixtures thereof, present in an amount greater than about 40% percent v/v of the total composition;

b) an effective silicone-based surface active agent for wetting and foaming present in an amount of at least 0.001% weight percent of the total composition; and

c) water present in an amount to balance the total composition to 100% weight percent.

5 In this aspect of the invention the effective silicone-based surface active agent is present in an amount from about 0.001% to about 10.0% weight percent of the total composition which is physiologically acceptable so it can be used in personal care type products.

10 In a preferred embodiment of the invention the silicone-based surfactant may be a Bis-PEG-20dimeth20 dimethicone , a 3-(3-Hydroxypropyl)-heptamethyltrisiloxane, an ethoxylated, acetate, a Polyether-modified polysiloxane or a Polysiloxane betaine.

The present invention also provides an alcohol disinfecting composition comprising:

15 a) ethanol present in an amount between about 60% to 70% percent v/v of the total composition;

b) a physiologically acceptable anionic silicone-based surfactant in an amount from about 0.01% to about 5.0% weight percent of the total composition;

c) foam stabilizing agents that include at least either 1,3-Butyleneglycol or
20 glycerine each present in a range from about 0.01 to about 10%;

d) a lipid layer enhancer such as a mixture of alkylglucoside and glyceryl oleate; and

e) water in an amount to balance the total composition to 100% weight percent.

The present invention also provides a composition concentrate, comprising;

a) an effective silicone-based surface active agent for wetting and foaming present in an amount of at least 0.01% weight percent of the total composition 0.01 to about 15.0 %;

b) a foam stabilizing agent including at least from about 0.01 to about 10.0% of glycerine or 2-butoxyethanol;

c) one of moisturizers, emollients and combinations thereof present in a range from about 0.05% to about 5.0%; and

d) water.

The present invention also provides an alcohol disinfecting composition, comprising;

a) an alcohol C₁₋₄, or mixtures thereof, present in an amount between about 60% to about 80% v/v of the total composition;

b) an effective physiologically acceptable silicone-based surface active agent for wetting and foaming present in an amount from about 0.01% to about 10.0% weight percent of the total composition;

c) a foam stabilizing agent present in an amount from about 0.01 to about 12.0 % weight percent;

d) any one of moisturizers, emollients and combinations thereof present in an amount from about 0.05 to about 5.0 % weight percent; and

e) water in an amount to balance the total composition to 100% weight percent.

DETAILED DESCRIPTION OF THE INVENTION

5 Definitions

The term "emollient" as used herein refers broadly to materials which are capable of maintaining or improving the moisture level, compliance, or appearance of the skin when used repeatedly.

10 The term "emulsifier" as used herein refers to surfactants or other materials added in small quantities to a mixture of two miscible liquids for the purpose of aiding in the formation and stabilization of an emulsion.

The phrase "emulsifying ingredients" as used herein is synonymous with emulsifier defined above.

15 The term "emulsion" as used herein refers to a colloidal dispersion of one liquid in another.

The term "surfactant" as used herein is the widely employed contraction for "surface active agents" which is the descriptive generic term for materials that preferentially adsorb at interfaces as a result of the presence of both lyophilic and lyophobic structural units, the adsorption generally resulting in the alteration of the surface or interfacial properties of the system.

20 The term "silicone-based surfactant" as used herein refers to a surface active agent in which the lipophilic chain contains a silicone chain, i.e. comprising $-(R_2Si-$

O)_n- and which enables the composition in which it is contained to clean, wet and foam.

The phrase "foam stabilizer" as used herein refers to an additive that increases the amount or persistence of foam produced by a surfactant system.

5 The term "disinfect" as used herein means to destroy or reduce harmful microorganisms.

10 The present invention provides compositions with high contents of lower alcohol (C₁₋₄) able to be dispensed as a foam. The foamable compositions when mixed with air deliver a stable foam to provide an alcoholic liquid solution which can be used for personal cleaning or for disinfecting purposes and which breaks on pressure application such as when a user rubs their hands or when applied over a surface.

15 The alcohol used in the present invention is a lower hydrocarbon chain alcohol such as a C₁₋₄ alcohol. The preferred alcohol is chosen from ethanol, 2-propanol, or n-propanol, most preferably ethanol, well accepted by Health Care personnel as an adequate disinfectant at the right percentages. The invention anticipates that a single alcohol may be used or that a blend of two or more alcohols may comprise the alcohol content of the composition for a foamable product.

20 The main achievement of the present invention is making compositions with a greater than 40% v/v alcohol content able to be dispensed as a cosmetically appealing foam.

The use of a silicone-based surfactant is the key ingredient as the primary foaming agent in the compositions designed to foam disclosed herein. Silicone

surfactants have various interesting properties such as leaving little residue, being able to function in harsh chemical and thermal environments; they have an unparalleled wetting power, characteristics that are in general better than those of traditional surfactants, they show better surface-active properties in organic solvents, and that have made them widely used for applications in coatings, oilfield, material finishes, cleaning, paints, pesticides application, etc.

The silicone-based surfactants suitable for these types of compositions may include, but are not limited to, ethoxylates, glycerol esters, amine oxides, acetylenic alcohol derivatives, carboxylates, phosphates, carbohydrate derivatives, sulfonates, betaines, esters, polyamides, silicones, and hydrocarbon surfactants that have a silicone chain $-(R_2Si-O)_n-$ and are compatible with the other components being used for a particular formulation.

In preferred embodiments of the compositions, the effective silicone-based surface active agent may be a physiologically acceptable Bis-PEG-20 dimethicone, a 3-(3-Hydroxypropyl)-heptamethyltrisiloxane, an ethoxylated, acetate, a Polyether-modified polysiloxane or a Polysiloxane betaine, or mixtures thereof from about 0.01% to about 10.0% weight percent of the total composition.

It was surprisingly found that despite the characteristics of silicone-based surfactants, there was little or no information on their use to produce a foamable product with high alcohol content.

Furthermore, in order to obtain a high alcohol content product able to produce a foam even if no pressurized containers or propellants are used, surface tension values as low as possible would be required so that the pressure required to

produce such foam by hand pumps and mechanical means would be sufficient. Hence, the lower than 20 dynes/cm (0.01% DW 25°C) surface tension values achievable with these surfactants made them suitable for the application.

During the development of the present invention, it was unexpectedly found that a relatively stable quick breaking aerated foam could even be obtained when using just ethanol and the silicone-based surfactant, while using traditional surfactants at even double the percentage yielded results that could not be even slightly similar and no foam at all could be obtained.

In order to achieve a commercially suitable formulation, reducing the amount of silicone-based surfactant used while using the assistance of other ingredients such as secondary surfactants, emulsifiers, foam stabilizers, fragrances, and the like ingredients employed in cosmetics, aerosols, toiletries, personal care, etc. is one of the approaches that followed. One of the commercial products obtained uses emulsifiers and polyethoxylated fatty acid surfactants disclosed in United States Patent Nos. 5,167,950 and 6,090,395, both incorporated herein by reference, while other examples use a combination of different foam stabilizers to achieve a similar result.

Examples of secondary surfactants that may be used in the present compositions include alkylglucosides, a poly(ethoxylated and/or propoxylated)alcohol, a poly(ethoxylated and/or propoxylated)ester, a derivative of a poly(ethoxylated and/or propoxylated)alcohol, a derivative of a poly(ethoxylated and/or propoxylated)ester, an alkyl alcohol, an alkenyl alcohol, an ester of a polyhydric alcohol, an ether of a polyhydric alcohol, an ester of a polyalkoxylated

derivative of a polyhydric alcohol, an ether of a polyalkoxylated derivative of a polyhydric alcohol, a sorbitan fatty acid ester, a polyalkoxylated derivative of a sorbitan fatty acid ester, a betaine, a sulfobetaines, imidazoline derivatives, aminoacid derivatives, lecithins, phosphatides, some amine oxides and sulfoxides and mixtures thereof, present in an amount between about 0.10 % to about 5% weight percent.

A preferred betaine is cocamidopropyl betaine. A preferred alkylglucoside is cocoglucoside. Preferred polyethoxylated fatty alcohols are polyethoxylated stearyl alcohol (21 moles ethylene oxide) and polyethoxylated stearyl alcohol (2 moles ethylene oxide), and a combination of these two.

The compositions may include an antimicrobial agent. The following antimicrobials are offered as non-limiting examples of suitable antimicrobials for use in the present invention and may include chlorhexidine salt, iodine, a complexed form of iodine, parachlorometaxilenol, triclosan, hexachlorophene, a phenol, a surfactant having a long chain hydrophobic group and a quaternary group, hydrogen peroxide, silver, a silver salt, silver oxide, and mixtures thereof.

A preferred antimicrobial agent in the present compositions is chlorhexidine gluconate (CHG) present in an amount between about 0.50 % to about 4.0 % weight percent. Another preferred antimicrobial agent is didecyl dimethyl diamonium chloride in an amount between about 0.05% to 5% weight percent.

If the amount of ingredients employed is little enough not to leave a tacky feeling after the composition evaporates after single or multiple uses, and this is achieved while maintaining at least 60% v/v ethanol or n-propanol concentration or

70% v/v isopropanol, then the composition would be ideal for use as an alcohol hand sanitizer/disinfectant foamable composition.

The addition of water to the alcohol produces a more stable foam while allowing to reduce the amount of silicone-based surfactant required to foam the product. For instance, using 0.5 to 1.0% silicone-based surfactant with a 50 to 60% v/v alcohol water solution produces a stable foam that does not readily collapse and that produces a stable puff that does not fall even when inverted and does not collapse until pressure is applied (such as when rubbed in hands or on over a surface) to provide an alcoholic liquid solution.

The use of a mild non-irritant surfactant widely used in the cosmetic industry such as cocamidopropyl betaine as a secondary surfactant is more suitable to prepare the foamable hydroalcoholic composition of the present invention depending on the silicone-based surfactant being used.

In order to stabilize the foam, foam stabilizers, as well as emulsifying ingredients have been tried with good results in allowing the product to be dispensed as a foam even when no propellant and/or pressurized container systems are used.

Examples of compatible foam stabilizers that can optionally be employed include lactic acid esters of monoglycerides, cationic emulsifiers, triquaternized stearic phospholipid complex, hydroxystearamide propyltriamine salts, lactic acid monoglycerides, food emulsifiers such as glyceryl monostearate, propylene glycol monostearate, sodium stearyl lactylate, silicone wax, an encapsulated oil, Microcapsule Mineral Oil.

A preferred foam stabilizer used in the present foamable compositions is cetyl betaine. Another preferred foam stabilizer is glycerine.

5 Examples of moisturizers and/or emollients which may be used in the present formulations include lanolin, vinyl alcohol, polyvinyl pyrrolidone and polyols selected from the group consisting of glycerol, propylene glycol, glyceryl oleate and sorbitol, cocoglucoside or a fatty alcohol selected from the group consisting of cetyl alcohol, stearyl alcohol, lauryl alcohol, myristyl alcohol and palmityl alcohol, cetyl alcohol, cetareth 20, and combinations thereof, present in an amount up to about 5%. The compositions may include a lipid layer enhancer such as a mixture of alkylglucoside and glyceryl oleate.

10 The compositions formulated to be dispensed as a foam may be stored in an unpressurized dispenser having a dispenser pump for mixing the composition with air and dispensing foam therefrom. The composition may include an aerosol propellant in an amount from about 3 to about 20 weight percent of the total composition for pressurized discharge of the foam. The aerosol propellant may include propane, carbon dioxide, butane, dichloro difluoro methane, dichloro tetra
15 fluoro ethane, octafluorocyclo butane; 1,1,1,2-tetrafluoroethane; 1,1,1,2,3,3,3 heptafluoropropane, and 1,1,1,3,3,3,-hexafluoropropane. When stored in a metal container with propellant, the formulation may include a corrosion inhibitor such as
20 sorbic acid, benzoic acid, potassium sorbate and sodium benzoate, in an amount from about 0.1 to about 5 weight percent of the total composition.

The following non-limiting examples are set forth to show for the various preferred embodiments and are not in any way to limit the scope of the present invention.

EXAMPLES

Examples 1 through 12 were prepared to illustrate the ability to produce alcohol-based disinfecting formulations which can be dispensed as foams using different surfactants and a solution of water and 50% ethanol. Examples 13 through 16 illustrate increasing concentrations of a silicone-based surfactant to produce foam with 40% ethanol. Examples 17 through 32 show increasing concentrations of ethanol with different silicone-based surfactants to produce foam. Examples 33 through 36 illustrate increasing concentrations of a silicone-based surfactant to produce acceptable foam at 62% ethanol. Examples 37 through 52 illustrate the ability to produce foam using different surfactants and a solution of 70%v/v Isopropanol. All parts and percentages are expressed by weight unless otherwise indicated.

Amount Ingredients	Ex. 1	Ex. 2	Ex. 3	Ex. 4	Ex. 5	Ex. 6
S.D. Alcohol 3-A	50.00	50.00	50.00	50.00	50.00	50.00
Silicone-based surfactant	0.50	-----	-----	-----	-----	-----
Cocamidopropyl betaine (1)	-----	8.00	-----	-----	-----	-----
Alkylglucoside (2)	-----	-----	8.00	-----	-----	-----
Alkylglucoside (3)	-----	-----	-----	8.00	-----	-----
Glycomul L	-----	-----	-----	-----	8.00	-----
Sorbitan Sesquileate	-----	-----	-----	-----	-----	8.00
Deionized Water	49.50	42.00	42.00	42.00	42.00	42.00
Total %	100.00	100.00	100.00	100.00	100.00	100.00
(1) Amphoteric, (2) Nonionic, (3) Anionic						
Amount Ingredients	Ex. 7	Ex. 8	Ex. 9	Ex. 10	Ex. 11	Ex. 12

5	S.D. Alcohol 3-A	50.00	50.00	50.00	50.00	50.00	50.00
	Polysorbate 20	8.00	-----	-----	-----	-----	-----
	Polyoxyethylene Sorbitan Monooleate	-----	8.00	-----	-----	-----	-----
	Sorbitan Monooleate	-----	-----	8.00	-----	-----	-----
	Cocamidopropyl betaine & sodium caproyl lactate	-----	-----	-----	8.00	-----	-----
	Cocamidopropyl hydroxysultaine	-----	-----	-----	-----	8.00	-----
	Sodium Cocoamphoacetate	-----	-----	-----	-----	-----	8.00
10	Deionized Water	42.00	42.00	42.00	42.00	42.00	42.00
	Total %	100.00	100.00	100.00	100.00	100.00	100.00
15	Amount Ingredients		Ex. 13	Ex. 14	Ex. 15	Ex. 16	
	S.D. Alcohol 3-A		40.00	40.00	40.00	40.00	
	Bis-PEG-20 dimethicone		0.01	-----	-----	-----	
	3-(3-Hydroxypropyl)-heptamethyltrisiloxane, ethoxylated, acetate		-----	-----	0.01	-----	-----
20	Polyether-modified polysiloxane		-----	-----	0.01	-----	
	Polysiloxane betaine		-----	-----	-----	0.01	
	Deionized Water		59.99	59.99	59.99	59.99	
	Total %		100.00	100.00	100.00	100.00	
25	Amount Ingredients		Ex. 17	Ex. 18	Ex. 19	Ex. 20	
30	S.D. Alcohol 3-A		40.00	50.00	60.00	75.00	
	Bis-PEG-20 dimethicone		0.01	0.01	0.01	8.00	
	Deionized Water		59.99	49.99	39.99	17.00	
35	Total %		100.00	100.00	100.00	100.00	
40	Amount Ingredients		Ex. 21	Ex. 22	Ex. 23	Ex. 24	
	S.D. Alcohol 3-A		40.00	50.00	60.00	75.00	
	Polysiloxane betaine		1.0	1.0	1.0	8.00	
	Deionized Water		59.000	49.00	49.00	17.00	
	Total %		100.00	100.00	100.00	100.00	
45	Amount Ingredients		Ex. 25	Ex. 26	Ex. 27	Ex. 28	
50	S.D. Alcohol 3-A		40.00	50.00	60.00	75.00	
	Polyether-modified polysiloxane*** improves with more OH		1.0	1.0	1.0	1.0	
	Silgard DOW						
	Deionized Water		59.00	49.00	39.00	24.00	
55	Total %		100.00	100.00	100.00	100.00	
60	Amount Ingredients		Ex. 29	Ex. 30	Ex. 31	Ex. 32	
	S.D. Alcohol 3-A		40.00	50.00	60.00	75.00	
	3-(3-Hydroxypropyl)-heptamethyltrisiloxane, ethoxylated, acetate		59.5	0.5	0.5	0.5	10.00
	Deionized Water			49.50	39.50	15.00	
	Total %		100.00	100.00	100.00	100.00	
65	Amount Ingredients		Ex. 33	Ex. 34	Ex. 35	Ex. 36	
70	S.D. Alcohol 3-A		62.00	62.00	62.00	62.00	
	Bis-PEG-20 dimethicone	0.50	1.00	2.0	5.00		
	Deionized Water		37.50	37.00	36.00	33.00	

Total %	100.00	100.00	100.00	100.00
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Amount Ingredients	Ex. 37	Ex. 38	Ex. 39	Ex. 40	Ex. 41	Ex. 42
70%v/v Isopropanol	99.90	92.00	92.00	92.00	92.00	92.00
Silicone-based surfactant	0.10	-----	-----	-----	-----	-----
Cocamidopropyl betaine (1)	-----	8.00	-----	-----	-----	-----
Alkylglucoside (2)	-----	-----	8.00	-----	-----	-----
Alkylglucoside (3)	-----	-----	-----	8.00	-----	-----
Glycomul L	-----	-----	-----	-----	8.00	-----
Sorbitan Sesquioleate	-----	-----	-----	-----	-----	8.00
Total %	100.00	100.00	100.00	100.00	100.00	100.00

(1) Amphoteric, (2) Nonionic, (3) Anionic

Amount Ingredients	Ex. 43	Ex. 44	Ex. 45	Ex. 46	Ex. 47	Ex. 48
70%v/v Isopropanol	92.00	92.00	92.00	92.00	92.00	92.00
Polysorbate 20	8.00	-----	-----	-----	-----	-----
Polyoxyethylene Sorbitan Monooleate	-----	8.00	-----	-----	-----	-----
Sorbitan Monooleate	-----	-----	8.00	-----	-----	-----
Cocamidopropylbetaine & sodium caproyl lactate	-----	-----	-----	8.00	-----	-----
Cocamidopropyl hydroxysultaine	-----	-----	-----	-----	8.00	-----
Sodium Cocoamphoacetate	-----	-----	-----	-----	-----	8.00
Total %	100.00	100.00	100.00	100.00	100.00	100.00

Amount Ingredients	Ex. 49	Ex. 50	Ex. 51	Ex. 52
70%v/v Isopropanol	99.00	99.00	99.00	99.00
Bis-PEG-20 dimethicone	1.0	-----	-----	-----
3-(3-Hydroxypropyl)-heptamethyltrisiloxane, ethoxylated, acetate	-----	-----	1.0	-----
Polyether-modified polysiloxane	-----	-----	1.0	-----
Polysiloxane betaine	-----	-----	-----	1.0
Total %	100.00	100.00	100.00	100.00

The solutions prepared, were evaluated as to whether foam was produced or not and if so, then the foam produced was described as follows:

Example	Foam Produced	Foam Evaluation/Description/Characteristics
Ex. 1	Yes	Very good stable stiff puff creamy and soft lasts a long time Just Very Wet Bubbles produced lasting <10 seconds
Ex. 2	No	
Ex. 3	No	
Ex. 4	No	-----
Ex. 5	No	-----
Ex. 6	No	Just Very Wet Bubbles produced lasting <7 seconds
Ex. 7	No	Just Very Wet Bubbles produced lasting <10 seconds

	Ex. 8	No	-----
	Ex. 9	No	Just Very Wet Bubbles produced lasting <10 seconds
	Ex. 10	No	-----
5	Ex. 11	No	-----
	Ex. 12	No	-----
	Ex. 13	Yes	Quick fast breaking foam lasts more than a minute
	Ex. 14	Yes	Very good puff creamy and soft lasts minutes
	Ex. 15	Yes	Very good puff creamy and soft lasts minutes
10	Ex. 16	Yes	Quick fast breaking foam lasts more than a minute
	Ex. 17	Yes	Very good puff creamy and soft lasts minutes
	Ex. 18	Yes	Good puff creamy and soft lasts minutes
	Ex. 19	Yes	Quick fast breaking foam lasts more than a 10secs
	Ex. 20	Yes	-----
15	Ex. 21	Yes	Runny watery foam which lasts more than 45secs
	Ex. 22	Yes	Quick fast breaking foam lasts more than a 10secs
	Ex. 23	Yes	Runny watery foam which lasts more than 20secs
	Ex. 24	Yes	-----
	Ex. 25	Yes	Runny watery foam which lasts more than 20secs
20	Ex. 26	Yes	Runny foam which lasts more than 20secs
	Ex. 27	Yes	Quick fast breaking foam lasts more than a 45secs
	Ex. 28	No	Quick fast breaking foam lasts more than a 45secs
	Ex. 29	Yes	Very good creamy and soft lasts more than a minute
	Ex. 30	Yes	Good creamy and soft lasts more than a minute
25	Ex. 31	Yes	Quick fast breaking foam lasts more than a 45secs
	Ex. 32	No	-----
	Ex. 33	No	Quick fast breaking foam lasts more than a minute
	Ex. 34	No	Good creamy and soft lasts more than a minute
	Ex. 35	No	Very good creamy and soft lasts more than a minute
30	Ex. 36	No	Very good creamy and soft lasts minutes
	Ex. 37	Yes	Quick fast breaking foam lasts more than a 20secs
	Ex. 38	No	-----
	Ex. 39	No	-----
	Ex. 40	No	-----
35	Ex. 41	No	-----
	Ex. 42	No	-----
	Ex. 43	No	-----
	Ex. 44	No	-----
	Ex. 45	No	-----
40	Ex. 46	No	-----
	Ex. 47	No	-----
	Ex. 48	No	-----
	Ex. 49	Yes	Runny watery foam which lasts more than a 45secs
	Ex. 50	Yes	Runny watery foam which lasts more than a 45secs
45	Ex. 51	Yes	Runny watery foam which lasts more than a 45secs
	Ex. 52	Yes	Runny watery foam which lasts more than a 45secs

Comparatively, it was also found that for instance, Cocamidopropyl betaine (CAPB) alone even at 40% ethanol and at 3% CAPB, was unable to produce as good results as those with 60%v/v ethanol, and Silicone-based surfactants using much less percentage (less than 1.0%). Cocamidopropyl betaine does not give any acceptable foam above that percentage of alcohol and the lower than 60% v/v alcohol content makes it inadequate for a sanitizing solution. Also the solution left an

unacceptable feeling on the skin after the alcohol evaporated (i.e. a soapy sticky feeling) indicating high levels of surfactant.

Very interestingly silicone-based surfactants seemed to be a likely way to achieve a foaming composition that contains more than 40% v/v alcohol. The fact that at the levels used the afterfeel was not only not soapy but actually pleasant makes the present invention suitable for many different applications.

Below are some specific examples for compositions following the above formulation to produce alcohol hand sanitizing solutions; more than one being a foamable disinfecting composition with alcohol being the only disinfectant ingredient, while other foamable disinfecting compositions use an added antimicrobial such as Chlorhexidine Digluconate or Didecyl Dimethyl Diammonium Chloride.

EXAMPLE 53

Alcohol hand sanitizing foamable disinfecting composition

0.01- 5.0 % * silicone-based surfactant (primary surfactant)

0.01 – 1.0% cocoamidopropylbetaine (secondary surfactant)

0.05 – 1.0% cetyl betaine (foam stabilizing agent)

0.10 – 1.5% emulsifier fatty alcohol ROH 16-22 carbons or combination that works well in a final formulation containing

60-70% v/v ethanol

Q.S. water

- Preferably Bis-PEG-20dimeth20 dimethicone , a 3-(3-Hydroxypropyl)-heptamethyltrisiloxane, an ethoxylated, acetate, a Polyether-modified polysiloxane or a Polysiloxane betaine, or mixtures thereof.

EXAMPLE 54

Alcohol hand sanitizing foamable disinfecting composition Concentrate

0.1- 5.0 % * a physiologically acceptable silicone-based surfactant*;(primary
surfactant)

0.001 – 12.0% 1,3 Butyleneglycol, 2-Butoxyethanol, or glycerin (foam stabilizing
agents)

0.05 – 5.0% cocoglucoside, glyceryl oleate (moisturizers, emollients and the like)

60-70% v/v ethanol, n-propanol, isopropanol or a combination thereof

Q.S. water

- Preferably Bis-PEG-20 dimethicone , a 3-(3-Hydroxypropyl)-heptamethyltrisiloxane, an ethoxylated, acetate, a Polyether-modified polysiloxane or a Polysiloxane betaine, or mixtures thereof.

EXAMPLE 55

Chlorhexidine gluconate (CHG) & alcohol hand sanitizing foamable disinfecting composition

Formulation 53 or 54 added with

0.50 – 4.0% Chlorhexidine Gluconate (CHG)

EXAMPLE 56

Formulations 53 or 54 added with

0.01 – 5.0% Didecyl Dimethyl Diammonium Chloride

The process to prepare the compositions of the present invention described herein is straightforward since most of the ingredients are liquid. When wax type ingredients are to be used, they can be incorporated by warming up to 40-45°C preferably to the water portion while mixing and then allowing it to cool down or they could be added in "cold", at room temperature to the alcohol before any other ingredient and mixed until completely incorporated before adding the rest of the ingredients according to the composition.

Active ingredients could be pre-dissolved into the water first. A process that anyone skilled in the art would have no problem implementing. If a specific formulation cannot be adjusted for the foamable composition in the percentages of the ingredients, then there is still the option of modifying the characteristics of the foaming pump, such as changing pressures, screen sizes, etc.

The compositions described herein provide improve over commercially available compositions with high concentrations of alcohol, as well as the fact they are able to foam with without the use of propellants or pressurized containers, although it will be appreciated that using propellants may in some cases improve the quality of the resulting foam.

Depending on the alcohol concentration and the application of the particular composition the foam produced can widely vary, being at the high end of a relatively fast breaking variety stable enough to be thoroughly spread onto the skin without waste in a unique way.

Due to the nature of the base composition with respect to the alcohol concentration and the quality of the ingredients, one of the logical first applications

for the present invention would be as an alcohol hand disinfectant composition for a foamable product, examples of which are described above. Nevertheless, the present invention lends itself to the preparation of a wide variety of products, and it is to be understood that other embodiments may be utilized and that changes may be made without departing from the scope of the invention.

Consequently, it is intended that the claims be interpreted to cover such modifications and equivalents. To note a few, the following may be mentioned: medicated foams, sunscreen foams, hand cream foams, brush-less shaving cream foams, shower or bath oil foams, dry hair shampoo foams, make-up remover foams, analgesic foam rubs, hair grooming foams and antiperspirants hair cleaning foam, antiperspirant foam, hair conditioner foams.

As used herein, the terms "comprises", "comprising", "includes" and "including" are to be construed as being inclusive and open ended, and not exclusive. Specifically, when used in this specification including claims, the terms "comprises", "comprising", "includes" and "including" and variations thereof mean the specified features, steps or components are included. These terms are not to be interpreted to exclude the presence of other features, steps or components.

The foregoing description of the preferred embodiments of the invention has been presented to illustrate the principles of the invention and not to limit the invention to the particular embodiment illustrated. It is intended that the scope of the invention be defined by all of the embodiments encompassed within the following claims and their equivalents.

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WHAT IS CLAIMED IS:

1. A composition, comprising;

a) a C₁₋₄ alcohol, or mixtures thereof, present in an amount greater than about 40% v/v of the total composition;

b) an effective physiologically acceptable silicone-based surface active agent for wetting and foaming present in an amount of at least 0.01% weight percent of the total composition; and

c) water present in an amount to balance the total composition to 100% weight percent.

2. The composition according to claim 1 including air, wherein when the composition is mixed with air, the mixture of the composition and air forms a foam.

3. The composition according to claims 1 or 2 wherein the effective silicone-based surface active agent for wetting and foaming is physiologically compatible, and wherein the silicone-based surfactant is selected from the group consisting of ethoxylates, glycerol esters, amine oxides, acetylenic alcohol derivatives, carboxylates, phosphates, carbohydrate derivatives, sulfonates, betaines, esters, polyamides, fluorinated surfactants, and hydrocarbon surfactants in which the lipophilic chain contains a silicone chain comprising $-(R_2Si-O)_n-$.

4. The composition according to claim 1, 2 or 3 wherein the effective silicone-based surface active agent is a physiologically acceptable Bis-PEG-20 dimethicone, a 3-(3-Hydroxypropyl)-heptamethyltrisiloxane, an ethoxylated, acetate, a Polyether-modified polysiloxane or a Polysiloxane betaine, or mixtures thereof from about 0.01% to about 10.0% weight percent of the total composition.
5. The composition according to claim 1, 2, 3 or 4 wherein the alcohol C₁₋₄ is an aliphatic alcohol selected from the group consisting of methanol, ethanol, isopropanol, n-propanol, butanol and combinations thereof.
6. The composition according to claim 1, 2, 3, 4 or 5 wherein the silicone-based surfactant is Bis-PEG-20 dimethicone,
7. The composition according to claim 1, 2, 3, 4 or 5 wherein the silicone-based surfactant is a 3-(3-Hydroxypropyl)-heptamethyltrisiloxane,
8. The composition according to claim 1, 2, 3, 4 or 5 wherein the silicone-based surfactant is a Polyether-modified polysiloxane
9. The composition according to claim 1, 2, 3, 4 or 5 wherein the silicone-based surfactant is a Polysiloxane betaine.

10. The composition according to claim 1, 2, 3, 4 or 5 wherein the silicone-based surfactant is a mixture of two or more of the silicone-based surfactants in claims 6, 7, 8 and 9.

11. The composition according to claim 1, 2, 3, 4, 5, 6, 7, 8, 9 or 10 wherein the alcohol is present in a range from about 40 % to about 90 % v/v.

12. The composition according to claim 1, 2, 3, 4, 5, 6, 7, 8, 9 or 10 wherein the alcohol is ethanol present in an amount of at least 60% v/v, and wherein the composition is for use as an alcohol foam for personal hygiene.

13. The composition according to claim 1, 2, 3, 4, 5, 6, 7, 8, 9 or 10 wherein the alcohol is a mixture of n-propanol and ethanol present in a combined amount of at least 60% v/v, and wherein the composition is for use as an alcohol foam for personal hygiene.

14. The composition according to claim 1, 2, 3, 4, 5, 6, 7, 8, 9 or 10 wherein the alcohol is a mixture of isopropanol and ethanol present in a combined amount of at least 60% v/v, and wherein the composition is for use as an alcohol foam for personal hygiene.

15. The composition according to claim 1, 2, 3, 4, 5, 6, 7, 8, 9 or 10 wherein the alcohol is isopropanol present in an amount of at least 70% v/v, and wherein the composition is for use as an alcohol foam for personal hygiene.

16. The composition according to claim 1, 2, 3, 4, 5, 6, 7, 8, 9 or 10 wherein alcohol is n-propanol present in an amount of at least 60% v/v, and wherein the composition is for use as an alcohol foam for personal hygiene.

17. The composition according to claim 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15 or 16 further including at least one additional surfactant for adjusting properties of the foam produced from the composition.

18. The composition according to claim 17 wherein the additional surfactant is selected from the group consisting of a poly(ethoxylated and/or propoxylated)alcohol, a poly(ethoxylated and/or propoxylated)ester, a derivative of a poly(ethoxylated and/or propoxylated)alcohol, a derivative of a poly(ethoxylated and/or propoxylated)ester, an alkyl alcohol, an alkenyl alcohol, an ester of a polyhydric alcohol, an ether of a polyhydric alcohol, an ester of a polyalkoxylated derivative of a polyhydric alcohol, an ether of a polyalkoxylated derivative of a polyhydric alcohol, a sorbitan fatty acid ester, a polyalkoxylated derivative of a sorbitan fatty acid ester, an alkylglucoside, a betaine, a sulfobetaine, an imidazoline derivative, an aminoacid derivative, a lecithin, a

phosphatide, an amine oxide, a fluorinated surfactant, a sulfoxide and mixtures thereof, present in an amount between about 0.10 % to about 5% weight percent.

19. The composition according to claim 18 wherein the betaine is cocamidopropyl betaine.

20. The composition according to claim 19 wherein the alkylglucoside is cocoglucoside.

21. The composition according to claim 18 wherein the polyethoxylated fatty alcohol is polyethoxylated stearyl alcohol (21 moles ethylene oxide).

22. The composition according to claim 18 wherein the polyethoxylated fatty alcohol is polyethoxylated stearyl alcohol (2 moles ethylene oxide).

23. The composition according to claim 18 wherein the polyethoxylated fatty alcohol is a combination of polyethoxylated stearyl alcohol (21 moles ethylene oxide) and polyethoxylated stearyl alcohol (2 moles ethylene oxide).

24. The composition according to claim 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22 or 23 including a foam stabilizing agent present in an amount up to 10%.

25. The composition according to claim 24 wherein the foam stabilizing agent is selected from the group consisting of lactic acid esters of monoglycerides, cationic emulsifiers, triquaternized stearic phospholipid complex, hydroxystearamide propyltriamine salts, lactic acid monoglycerides, food emulsifiers such as glyceryl monostearate, propylene glycol monostearate, sodium stearyl lactylate, cetyl betaine, glycoether, n-propanol, butyleneglycol, silicone wax, an encapsulated oil, Microcapsule Mineral Oil, and combinations thereof.

26. The composition according to claim 24 wherein the foam stabilizing agent is selected from the group consisting of glycoether, glycerine, butyleneglycol, and combinations thereof.

27. The composition according to any one of claims 1 to 26 including any one of a moisturizer, emollient and combinations thereof selected from the group consisting of lanolin, vinyl alcohol, polyvinyl pyrrolidone and polyols selected from the group consisting of glycerol, propylene glycol, butyleneglycol and sorbitol, or a fatty alcohol selected from the group consisting of cetyl alcohol, stearyl alcohol, lauryl alcohol, myristyl alcohol and palmityl alcohol, cetyl alcohol, cetareth 20, or an alkylglucoside and combinations thereof, present in an amount up to 5%.

28. The composition according to any one of claims 1 to 27 further comprising an acid or a base to adjust a pH of the composition to a pre-selected pH present

in an amount from about 0.05 to about 0.5 % weight percent of the total composition.

29. The composition according to claim 28 wherein when an acid is used to adjust the pH the acid is selected from the group consisting of hydrochloric acid, citric acid and phosphoric acid, and wherein when a base is used to adjust the pH the base is sodium sesquicarbonate.

30. The composition according to any one of claims 1 to 29 including a preservative in an amount from about 0.01 to about 5 % weight percent of the total composition.

31. The composition according to any one of claims 1 to 30 including an antimicrobial agent.

32. The composition according to claim 31 wherein the antimicrobial agent is chlorhexidine gluconate present in an amount between about 0.50 % to about 4.0 % weight percent.

33. The composition according to claim 31 wherein the antimicrobial agent is didecyl dymethyl diamonium chloride present in an amount between about 0.05 % to about 5.0 % weight percent.

34. The composition according to claim 31 wherein the antimicrobial agent is selected from the group of a chlorhexidine salt, iodine, a complexed form of iodine, parachlorometaxlenol, triclosan, hexachlorophene, a phenol, a surfactant having a long chain hydrophobic group and a quaternary group, hydrogen peroxide, silver, a silver salt, silver oxide, and mixtures thereof.

35. The composition according to any one of claims 1 to 34 further comprising constituents selected from the group consisting of organic gums and colloids, lower alkanolamides of higher fatty acids, short chain diols and/or triols, fragrance, coloring matter, ultraviolet absorbers, solvents, suspending agents, buffers, conditioning agents, antioxidants, bactericides and medicinally active ingredients, and combinations thereof.

36. The composition according to any one of claims 1 to 35 stored in an unpressurized dispenser having a dispenser pump for mixing the composition with air and dispensing foam therefrom.

37. The composition according to any one of claim 1 to 35 stored in a pressurized dispenser having a dispenser pump for mixing the composition with air or a propellant and dispensing foam therefrom, the composition including an aerosol propellant in an amount from about 3 to about 20 weight percent of the total composition.

38. The composition according to claim 37 wherein the aerosol propellant is selected from the group consisting of propane, carbon dioxide butane, dichloro difluoro methane, dichloro tetra fluoro ethane octafluorocyclo butane; 1,1,1,2-tetrafluoroethane; 1,1,1,2,3,3,3 heptafluoropropane, and 1,1,1,3,3,3,-hexafluoropropane.

39. The composition according to claim 37 or 38 including a corrosion inhibitor is selected from the group consisting of sorbic acid, benzoic acid, potassium sorbate and sodium benzoate, in an amount from about 0.1 to about 5 weight percent of the total composition.

40. A composition concentrate, comprising;

a) an effective silicone-based surface active agent for wetting and foaming present in an amount of at least 0.01% weight percent of the total composition 0.01to about 15.0 %;

b) a foam stabilizing agent including at least from about 0.01 to about 10.0% of glycerine or 2-butoxyethanol;

c) one of moisturizers, emollients and combinations thereof present in a range from about 0.05% to about 5.0%; and

d) water.

41. The composition concentrate according to claim 40 wherein the effective silicone-based surface active agent is a physiologically acceptable Bis-PEG-20

dimethicone , a 3-(3-Hydroxypropyl)-heptamethyltrisiloxane, an ethoxylated, acetate, a Polyether-modified polysiloxane or a Polysiloxane betaine, or mixtures thereof

42. The composition concentrate according to claim 40 or 41 wherein the foam stabilizing agent includes glycerine or 2-Butoxyethanol.

43. The composition concentrate according to claim 40, 41 or 42 wherein the moisturizers and emollients include cocoglucoside, and glyceryl oleate.

44. The composition concentrate according to claim 40, 41, 42 or 43 which is constituted as an alcohol disinfecting composition by adding

a) an alcohol C₁₋₄, or mixtures thereof, present in an amount between about 60 to about 80% v/v of the total composition;

c) water present in an amount to balance the total composition to 100% weight percent.

45. The composition concentrate according to claim 44 wherein the alcohol C₁₋₄ is selected from the group consisting of ethanol, n-propanol, isopropanol and combinations thereof.

46. The composition concentrate according to any one of claims 40 to 45 made by a process of mixing the constituents and then warming the concentrate

to a temperature between about 30 to about 80 degrees Celsius prior to shipping the concentrate.

47. An alcohol disinfecting composition, comprising;

a) an alcohol C₁₋₄, or mixtures thereof, present in an amount between about 60% to about 80% v/v of the total composition;

b) an effective physiologically acceptable silicone-based surface active agent for wetting and foaming present in an amount from about 0.01% to about 10.0% weight percent of the total composition;

c) a foam stabilizing agent present in an amount from about 0.01 to about 12.0 % weight percent;

d) any one of moisturizers, emollients and combinations thereof present in an amount from about 0.05 to about 5.0 % weight percent; and

e) water in an amount to balance the total composition to 100% weight percent.

48. The alcohol disinfecting composition according to claim 47 including air, wherein when the disinfecting composition is mixed with air, the mixture of disinfecting composition and air forms a foam.

49. The alcohol disinfecting composition according to claims 47 or 48 wherein the silicone-based surfactant is Bis-PEG-20 dimethicone ,

50. The alcohol disinfecting composition according to claim 47 or 48 wherein the silicone-based surfactant is a 3-(3-Hydroxypropyl)-heptamethyltrisiloxane,

51. The alcohol disinfecting composition according to claim 47 or 48 wherein the silicone-based surfactant is a Polyether-modified polysiloxane

52. The alcohol disinfecting composition according to claim 47 or 48 wherein the silicone-based surfactant is a Polysiloxane betaine.

53. The composition according to claim 47 or 48 wherein the silicone-based surfactant is a mixture of two or more of the silicone-based surfactants in claims 49 through 52

54. The composition according to claim 47 or 48 wherein the effective silicone-based surface active agent for wetting and foaming is physiologically acceptable and compatible, and wherein the silicone-based surfactant is selected from the group consisting of ethoxylates, glycerol esters, amine oxides, acetylenic alcohol derivatives, carboxylates, phosphates, carbohydrate derivatives, sulfonates, betaines, esters, polyamides, fluorinated surfactants, and hydrocarbon surfactants in which the lipophilic chain contains a silicone chain, i.e. comprising $-(R_2Si-O)_n-$.

55. The alcohol disinfecting composition according to claim 47 through 54 wherein the foam stabilizing agent is selected from the group consisting of lactic acid esters of monoglycerides, cationic emulsifiers, triquaternized stearic phospholipid complex, hydroxystearamide propyltriamine salts, lactic acid monoglycerides, food emulsifiers such as glyceryl monostearate, propylene glycol monostearate, sodium stearyl lactylate, silicone wax, an encapsulated oil, Microcapsule Mineral Oil, butyleneglycol, butoxyethanol and or n-propanol and mixtures thereof.

56. The alcohol disinfecting composition according to any one of claims 47 through 54 wherein the foam stabilizing agent is selected from the group consisting of 2-butoxyethanol, glycerine butyleneglycol, and combinations thereof.

57. The alcohol disinfecting composition according to claims 47 through 54 including any one of a moisturizer, emollient and combinations thereof selected from the group consisting of lanolin, vinyl alcohol, polyvinyl pyrrolidone and polyols selected from the group consisting of glycerol, propylene glycol, butyleneglycol and sorbitol, or a fatty alcohol selected from the group consisting of cetyl alcohol, stearyl alcohol, lauryl alcohol, myristyl alcohol and palmityl alcohol, cetyl alcohol, cetareth 20, or an alkylglucoside and combinations thereof, present in an amount up to 5%.

58. The alcohol disinfecting composition according to claim 47 through 54 including a moisturizer and an emollient selected from the group consisting of glyceryl oleate, glycerine, cocoglucoside and combinations thereof.

59. The alcohol disinfecting composition according to claim 47, through 54 including an antimicrobial agent.

60. The alcohol disinfecting composition according to claim 59 wherein the antimicrobial agent is chlorhexidine gluconate present in an amount between about 0.50 % to about 4.0 % weight percent.

61. The alcohol disinfecting composition according to claim 59 wherein the antimicrobial agent is Didecyl Dymethyl Diamonium Chloride present in an amount between about 0.50 % to about 5.0 % weight percent.

62. The alcohol disinfecting composition according to claim 59 wherein the antimicrobial agent is selected from the group of a chlorhexidine salt, iodine, a complexed form of iodine, parachlorometaxylenol, triclosan, hexachlorophene, a phenol, a surfactant having a long chain hydrophobic group and a quaternary group, hydrogen peroxide, silver, a silver salt, silver oxide, and mixtures thereof.

63. The alcohol disinfecting composition according to any one of claims 47 to 62 including a preservative in an amount from about 0.01 to about 5 % weight percent of the total composition.

64. The alcohol disinfecting composition according to any one of claims 47 to 62 including a preservative in an amount from about 0.01 to about 5 % weight percent of the total composition.

65. The alcohol disinfecting composition according to any one of claims 47 to 64 further comprising an acid or a base to adjust a pH of the disinfecting composition to a pre-selected pH present in an amount from about 0.05 to about 0.5 % weight percent of the total composition.

66. The alcohol disinfecting composition according to claim 65 wherein the acid is selected from the group consisting of hydrochloric acid, citric acid and phosphoric acid, and the base is sodium sesquicarbonate.

67. The alcohol disinfecting composition according to any one of claims 47 to 66 stored in an unpressurized dispenser having a dispenser pump for mixing the disinfecting composition with air and dispensing foam therefrom.

68. The alcohol disinfecting composition according to any one of claims 47 to 66 stored in a pressurized dispenser having a dispenser pump for mixing the

disinfecting composition with air or a propellant and dispensing foam therefrom, the disinfecting composition including an aerosol propellant in an amount from about 3 to about 20 weight percent of the total composition.

69. The alcohol disinfecting composition according to claim 68 wherein the aerosol propellant is selected from the group consisting of propane, carbon dioxide, butane, dichloro difluoro methane, dichloro tetra fluoro ethane octafluorocyclo butane; 1,1,1,2-tetrafluoroethane; 1,1,1,2,3,3,3 heptafluoropropane, and 1,1,1,3,3,3,-hexafluoropropane.

70. The alcohol disinfecting composition according to claim 68 or 69 including a corrosion inhibitor is selected from the group consisting of sorbic acid, benzoic acid, potassium sorbate and sodium benzoate, in an amount from about 0.1 to about 5 weight percent of the total composition.

71. The alcohol disinfecting composition according to any one of claims 47 to 70 including any one of a moisturizer, emollient and combinations thereof selected from the group consisting of lanolin, vinyl alcohol, polyvinyl pyrrolidone and polyols selected from the group consisting of glycerol, propylene glycol, butyleneglycol and sorbitol, or a fatty alcohol selected from the group consisting of cetyl alcohol, stearyl alcohol, lauryl alcohol, myristyl alcohol and palmityl alcohol, cetyl alcohol, cetareth 20, or an alkylglucoside and combinations thereof, present in an amount up to 5%.

72. The alcohol disinfecting composition according to any one of claims 47 to 71 further comprising other constituents or materials including organic gums and colloids, lower alkanolamides of higher fatty acids, short chain diols and/or triols, fragrance, coloring matter, additional emollients, ultraviolet absorbers, solvents, emulsifiers, foam stabilizers or mixture of such stabilizers, suspending agents, buffers, conditioning agents, antioxidants, bactericides, medicinal active ingredient, and the like) that may be commonly added to aerosol compositions, toiletries, cosmetics and pharmaceuticals.

ABSTRACT

This invention relates to a "high lower alcohol content" (>40% v/v of a C₁₋₄ alcohol) liquid composition able to be dispensed as a stable foam with the use of non-propellant foam dispensing devices from non-pressurized containers. The liquid compositions comprise an alcohol, C₁₋₄ (>40% v/v), a silicone-based surfactant of at least 0.001% by weight to prepare a foamable composition, 0-10% w/w of additional minor components added to obtain the desired performance (a foamable composition), and the balance being purified water. The compositions may include emulsifier-emollients and moisturizers, secondary surfactants, foam stabilizers, fragrances, antimicrobial agents, other type of medicinal ingredients, and the like ingredients or additives or combinations thereof commonly added to alcohol gels or foams, aerosol compositions or to toiletries, cosmetics, pharmaceuticals and the like.